USER MANUAL

SecureKey™ M100/M130 Encrypted Keypad with Optional Encrypted MSR

80120502-001-B
June 22, 2011

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Revision History

Revision	Description	Date
50	First draft release for internal review	03/14/11
A	Initial Release	05/14/11
B	-Modified output format and added example data -Added instruction to change the initial key in the demo software -Modified commands to change XML output field settings	06/22/11

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1.0 Introduction

ID TECH SecureKey M series is an encrypted numeric keypad with an optional Magnetic Swipe Reader (MSR). The Secure keypad allows the retailers to not only encrypt credit card data at the magnetic readers but it also encrypts manually entered credit card number. The SecureKey M series has 15 keys (10 Numeric, 5 functional) with a 2x20 backlit LCD.

SecureKey M series keypads encrypt the data using TDES or AES algorithm format with DUKPT key management. For encrypted card reader settings and operations, please refer to 80096504-001 SecureMag User Manual.

SecureKey M series is available in USB-Keyboard and USB-HID interface.

2.0 Product Configurations

SecureKey M100/M130 comes in the following configurations:

Model Number	Description
IDKE-504800B	Securekey M100;USB-KB;15Key;No MSR;Blk
IDKE-534833B	Securekey M130;USB-KB;15Key;3T;Blk
IDKE-534833BE	Securekey M130;USB-KB;15Key;3T;Blk;Enhanced output
IDKE-504800BL	Securekey M100;USB-KB;15Key;No MSR;Blk;XML output
IDKE-534833BL	Securekey M130;USB-KB;15Key;3T;Blk;XML output

3.0 Features

- Encrypted numeric keypad with 2x20 LCD and optional encrypted MSR
- 1,000,000 swipe, industry proven Magnetic Stripe Reader
- 20,000,000 key operations for each key
- Meets FCC Class B & CE regulatory requirements
- Plug-n-Play operation for USB-Keyboard and USB-HID interface
- Keypad is encrypted using DUKPT and TDES/AES encryption.
- Optional encrypted MSR with DUKPT and TDES/AES encryption
- Works with Windows 95/98, WINME 2000, XP, & Vista
- Available in standard and XML output format

4.0 Definition of Terms & Applicable Documents

ANSI	American National Standard Institute
ESD	Electrostatic Discharge
HOST	A Personal Computer or Similar Computing Device
ISO	International Standards Organization
MTBF	Mean Time Between Failures
RoHS	Restrictions of Hazardous Substances
USB	Universal Serial Bus

ISO/IEC 7813 – Identification cards, Physical Characteristic
ISO/IEC 7811 – Identification cards, Recording Techniques, Magnetic Stripe
Keyboard Key Code Specification Revision 1.3a, 3/16/2000, Microsoft Corporation

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5.0 Function & Operation

On power_on the device will go into its data capture mode. In data capture mode the device will prompt the user to enter data.

The device would display "Key is not injected!" if the device is not key-injected with encryption enabled and a key is pressed. The evaluation unit is injected with the ID TECH demo key by default and the data can be decrypted using the ID TECH SecureKey demo software.

Function Keys Operation:
Clear:

- Pressing the "Clear" key allows users to remove all entered data at the current level. The current transaction would not be cancelled.

BS:

- Pressing the "BS" (backspace) key allows users to remove the entered data one character at a time.

#Admin:

- Pressing the "#Admin" key when the screen displays "Swipe or Hand-Key Card Number" or "Enter Card Number then press Enter" allows user to enter the Admin Menu. Pressing the "#Admin" key in other screens puts the device in the Help Mode.

Cancel:

- Pressing the “Cancel” key once allows users to remove all the input in the current as well as the previous level. The device then goes back to the previous prompt of the current transaction. If the “Cancel” key is pressed twice, the current transaction would be cancelled and the device goes back to the initial mode.

Admin Menu
When the “Admin” key is pressed, the screen will display **"Select manual config 1-5"** to prompt the user to select one of five manual entry modes.

Manually-Keyed Configuration Options
Configuration #1: Card Number, Expiration Date
Configuration #2: Card Number, Expiration Date, Zip Code
Configuration #3: Card Number, Expiration Date, Street Number of the Address, Zip Code
Configuration #4: Card Number, Expiration Date, Zip Code, Security Code
Configuration #5: Card Number, Expiration Date, Address, Zip Code, Security Code

When the user selects the key corresponding to a manual mode, and then selects enter, the mode will be configured and the unit will return to the data capture mode. If the user selects more than one key, then the last key selected will be used to select the mode.
If a invalid key is selected the unit will display **"error"** then **"Select manual config 1-5"**

Help Mode
If the user selects the Admin key while in Admin mode, the unit enters the Help Mode. In the Help Mode, the unit displays short text messages of the various manual entry configurations with a 3 seconds pause between each message. Hitting any key in the Help Mode makes the unit return to the Admin Menu.

6.0 Data Output Format

There are two data output formats for SecureKey M100/ M130, one is the ID TECH standard data output format and the other is XML output format.

6.1 ID TECH Standard Data Output Format

STX
1 Data Length low byte
2 Data Length high byte
3 Card Encode Type[1]
4 Track 1-3 Status[2]
5 T1 data length
6 T2 data length
7 T3 data length
8 Clear/mask data sent status[3] (not applicable if key-in)
9 Encrypted/Hash data sent status[4] (not applicable if key-in)
10 T1 clear/mask data - (Track 1 data) (not applicable if key-in)
T2 clear/mask data - (Track 2 data) (not applicable if key-in)
T3 clear/mask data - (Track 3 data) (not applicable if key-in)
T1 encrypted data - (Track 1 encrypted data) (not applicable if key-in)
T2 encrypted data - (Track 2 encrypted data) (not applicable if key-in)
T3 encrypted data - (Track 3 encrypted data) (not applicable if key-in)
AddrStatus (1 byte)
ECData Encrypted card data (max: 180 bytes) (for SecureKey key-in only)
ECData hashed (20 bytes each) (for SecureKey key-in only)
Exp Expiration date (len: 4+1 bytes) (for SecureKey key-in only)
AVSAddr Street number (max: 20+1 bytes) (for SecureKey key-in only)
AVSZip Zip code (max: 10+1 bytes) (for SecureKey key-in only)

T1 hashed (20 bytes each) (if encrypted and hash tk1 allowed) (not applicable if key-in)
T2 hashed (20 bytes each) (if encrypted and hash tk2 allowed) (not applicable if key-in)
T3 hashed (20 bytes each) (if encrypted and hash tk3 allowed) (not applicable if key-in)
KSN (10 bytes)
CheckLRC
CheckSum
ETX

Note 1 : Card Encode Type

Value	Encode Type Description
0 / 80	ISO/ABA format

1 / 81	AAMVA format
3 / 83	Other
4 / 84	Raw; un-decoded format.
85	Key-In.

Note 2: Track 1-3 status byte

Field 4:
Bit 0: 1— track 1 decoded data present
Bit 1: 1— track 2 decoded data present
Bit 2: 1— track 3 decoded data present
Bit 3: 1— track 1 sampling data present
Bit 4: 1— track 2 sampling data present
Bit 5: 1— track 3 sampling data present
Bit 6, 7 — Reserved for future use

Note 3: Clear/mask data sent status
Field 8 (Clear/mask data sent status) and field 9 (Encrypted/Hash data sent status) will only be sent out in enhanced encryption format.

Field 8: Clear/masked data sent status byte:
Bit 0: 1 —track 1 clear/mask data present
Bit 1: 1— track 2 clear/mask data present
Bit 2: 1— track 3 clear/mask data present
Bit 3: 0— reserved for future use
Bit 4: 0— reserved for future use
Bit 5: 0— reserved for future use

Note 4: Encrypted/Hash data sent status

Field 9: Encrypted data sent status
Bit 0: 1— track 1 encrypted data present
Bit 1: 1— track 2 encrypted data present
Bit 2: 1— track 3 encrypted data present
Bit 3: 1— track 1 hash data present
Bit 4: 1— track 2 hash data present
Bit 5: 1— track 3 hash data present
Bit 6: 1—session ID present
Bit 7: 1—KSN present

Other note:

- Data Length low byte/high byte should be in length of characters (USBKB) and in length of bytes (USBHID).
- ECData include encrypted card key-in data, expiration date (YYMM) and 3/4 digit security code (cc).
  The format should be:

1) (Security level 3) Card Data=YYMM=cc
2) (Security level 3 without cc) Card Data=YYMM=
3) (Security level 4) Card Data=YYMM=cc= Session ID (8 bytes)

Each field is separated by delimiter '=', this should always present even cc is not keyed-in.

- The format of the field ECData, Exp, AVSAddr and AVSZip should be:

1 byte length of decrypted data in Hex (in byte)	Data

The length byte describe the length of decrypted data not include sessionID if it is level 4.

- If the field is not applicable then the field will not be sent out.
- AddrStatus: eg. If bit 2 is 1, expDate exist.

bit 3	bit 2	bit 1	bit 0
nil	expDate	AVSAddr	AVSZip

Original Encryption Format Swipe Output

028801001F372300%*5150********7903^PAYPASS/MASTERCARD^**********
?*;5150*****7903=***************?*8871B640F379F3BD8D057A13F81454
39B28D80BE8A43F3440D85928F576065EEE1BA54CAADFF67D552C2B0CBF1A9F
34B63402B967998FC7C80487C8A6DBFD46975985D3D7E865FEEF6A48930751DC9
71FDFCBC1989294B7EF6F0D0007AA731C31F574608EB85E57751DA48970F96B0E
8BECDB94D672D746C2CC75176FA6E0C9E6FEFE0B154A0959B6299490125000000
00197F6903

Key Value: F5 BF 6B E8 55 AB 92 3A DE 7E 77 40 D8 46 F9 DE
KSN: 62 99 49 01 25 00 00 00 00 1A

Decrypted Data:

Data in ASCII Format
%B5150710200107903^PAYPASS/MASTERCARD^090910140000631??;5150710200
107903=09091014000631?0

Data in HEX Format
2542353135303731303230303130373930335E504159504153532F4D415354455243415
2445E3039303931303134303030303633313F3F3B353135303731303230303130373930
333D3039303931303134303030303633313F30000000000000

Enhanced Encryption Format Swipe Output

028C01801F372300039B%*5150********7903^PAYPASS/MASTERCARD^*******
********?*;5150********7903=***************?*C5E75008986207CBFC9B1DA1
9F6EFFB392E26C04C3BC76121C480A3B6FC122EDCE85B813682DAC3628002507
B424831A0D6196BDF563F182147055DDF7F5CB7EA2226764915B3A1B4119010513

2DB237068A9F56407F7FB69F39A429B97EB1911F574608EB85E57751DA48970F96
B0E8BECDB94D672D746C2CC75176FA6E0C9E6FEFE0B154A0959B629949012500
0000001B777703

Key Value: 32 68 28 A3 E4 F5 84 48 09 D2 8A B5 EB B8 AA 74
KSN: 62 99 49 01 25 00 00 00 00 1C

Decrypted Data:

Data in ASCII Format
%B5150710200107903^PAYPASS/MASTERCARD^090910140000631??
;5150710200107903=0909101400000631?0

Data in HEX Format
25423531353037313032303031303739303 35E50415950415353 2F4D415354455243415
2445E3039303931303134303030303633313F3F00
3B3531353037313032303031303739303 33D303930393130313430303030363313F300
000000000

Manual key in
029C0085000000000718A1F6300C7241C9933DE31A01AB0C6021563FFC7B4810D9
4DA8863CE5EC84B37EA79A87D96572047CFCF1068F0430393039053130373231053
9303633306299490125000000001D095B03

Key Value: B8 C7 3E 0A 17 58 09 5A 7A 86 44 6F 9B B5 76 FF
KSN: 62 99 49 01 25 00 00 00 00 1D

Decrypted Data:

Data in ASCII Format
515710200107903=0909=356

Data in HEX Format
353135373130323030313037393033D303930393D333536

6.2 XML Data Output Format

The XML data output format is as below. Messages (swiped and keyed credit, debit, other, gift, drivers licenses, etc.) need to include at least the <Addr></Addr> tag. The XML tags needs to be in the following order:

```
<DvcMsg Ver="1.1">
    <Dvc attribute list ...></Dvc>
    <Card attribute list ...></Dvc>
    <Addr attribute list ...></Dvc>
    <Tran attribute list ...></Dvc>
</DvcMsg>
```

Field Name	Attribute	Required	Max Length	Type	Description
Ver	DvcMsg	Required	10	String	Device Message Version (use 1.1)
App	Dvc	Required	50	String	Application Name
AppVer	Dvc	Required	10	String	Application Version
DvcType	Dvc	Required	40	String	Device Type (MODEL-MANUFACTURER)
DvcSN	Dvc	Required	40	String	Device Serial Number
Entry	Dvc	Required	20	String	Card Entry Method (SWIPE, MANUAL, CONTACTLESS)
CEncode	Card	Optional	2	Integer	Card Encoding Type: 0 = ISO/ABA 1 = AAMVA 2 = Keyed (Manual Keyed) 3 = Other
Trk1	Card	Optional	240	String	Track 1 (currently only used for non-financial cards)
Trk2	Card	Optional	180	String	Track 2 (currently only used for non-financial cards)
Trk3	Card	Optional	180	String	Track 3 (currently only used for non-financial cards)
ETrk1	Card	Optional	240	String	Encrypted Track 1
ETrk2	Card	Optional	180	String	Encrypted Track 2
ECData	Card	Optional	180	String	Encrypted Card Data (Card Number=ExpDate(YYMM)=Security Code)
CDataKSN	Card	Optional	40	String	Card Data Key Serial Number
MskPAN	Card	Optional	30	String	Masked PAN. Format: 4003********6781
Exp	Card	Optional	8	String	Expiration Date. Format: YYMM
CHolder	Card	Optional	80	String	Cardholder Name
AVSAddr	Addr	Optional	50	String	AVS Address
AVSZip	Addr	Optional	20	String	AVS Zip Code
TranType	Tran	Required	40	String	Transaction Type (CREDIT, DEBIT)

Field Name	Attribute	Required	Max Length	Type	Description
EFormat	Card	Optional	2	Integer	Encryption Format: 0 = Default 1 = Format1 2 = Format2 3 = Format3 4 = Format4 5 = Reserved for future use 6 = Reserved for future use

The data output format is XML output message protocol.

The DvcType, DvcApp, DvcMsgVer, and AppVer field can be configured by the following commands:

53 77 53 4B <function ID><data length> <data>

Set DvcType example: 53 77 53 4B 5C 0B 4D 31 33 30 2D 49 44 54 45 43 48

Set DvcApp example: 53 77 53 4B 5D 12 53 65 63 75 72 65 4B 65 79 20 53 6F 66 74 77 61 72 65

Set DvcMsgVer example: 53 77 53 4B 5E 03 31 2E 30

Set AppVer example: 53 77 53 4B 5F 03 31 2E 30

Credit Card Swipe Sample XML:

<DvcMsg Ver="1.1"><Dvc App="SecureKey Software" AppVer="1.0" DvcType="M130-IDTECH" DvcSN="FFFFFFFFFFFFFFFF" Entry="SWIPE"></Dvc><Card CEncode=" 0" ETrk1="9719BCB11786D9F5D26CD2350C6307D82FA980E6E73A02760F2383C2AF9BB8A6A875083B049582C91FCB542A06591DF223034C1A9EAC64A3166406B8516123F5200AC773BAF8ECDD" ETrk2="4623A11A24D344A71137EB2EE5A2E5F4A013E7D286FB9A8A5523316720DF6B47473166171154A07F" CDataKSN="6299490123000000002F" Exp="0809" MskPAN="4266********9999" CHolder="BUSH JR/GEORGE W.MR" EFormat="4"></Card><Tran TranType="CREDIT"></Tran></DvcMsg> CarriageReturn

Key Value: ED 07 9C 5F 5E 5D F7 E2 03 7B 7F F3 36 F7 10 54
KSN: 62 99 49 01 23 00 00 00 00 2F

Decrypted Data in ASCII:

%B4266841088889999^BUSH JR/GEORGE
W.MR^08091011000011000000000046000000?!
;4266841088889999=0809101100000046?0

Decrypted Data in Hex:
2542343236363834313038383838393939395E42555348204A522F47454F52474520572
E4D525E303830393130313130303030313130303030303030303034363030303030303F
21
3B343236363834313038383838393939393D303830393130313130303030303034363F300
000000000

Credit Card Manually Keyed Sample XML:

<DvcMsg Ver="1.1"><Dvc App="SecureKey Software" AppVer="1.0"
DvcType="M130-IDTECH" DvcSN="FFFFFFFFFFFFFFFF"
Entry="MANUAL"></Dvc><Card CEncode="2"
ECData="F4EA319F165989392A5A1BA747EF82FF2461DC3CB8B68995F315FCFE5
4A81CF6" CDataKSN="62994901230000000030" Exp="1206"
MskPAN="1234**********6789" EFormat="4"></Card><Addr AVSAddr="10721"
AVSZip="91741"></Addr><Tran TranType="CREDIT"></Tran></DvcMsg>
CarriageReturn

Key Value: CA DC 1C 5A D6 5A FF 5D 06 81 A1 E3 37 51 A4 5A
KSN: 62 99 49 01 23 00 00 00 00 30

Decrypted Data in ASCII:
1234567890123456789=1206=123

Decrypted Data in Hex:
313233343536373839303132333435363738393D313230363D31323300000000

Non-Financial Card Swipe Sample XML:

<DvcMsg Ver="1.1"><Dvc App="SecureKey Software" AppVer=”1.0”
DvcType=”M130-IDTECH” DvcSN="FFFFFFFFFFFFFFFF"
Entry="SWIPE"></Dvc><Card
CEncode="3" Trk1=”Track1ofGiftCardData"Trk2="Track2ofGiftCardData"
CDataKSN="A08B000C0000002000E6" MskPAN="1212********5588" Exp="1512"
CHolder=" BUSH JR/GEORGE W.MR " EFormat="4"></Card><Addr></Addr><Tran
TranType="OTHER" ></Tran></DvcMsg>
CarriageReturn

Note:

- Manually entered data should always be financial card data.

- The non-encrypted track fields (Trk1, Trk2, Trk3) are only used when the format is a non-financial card.
- "EFormat" is defined by the applicaiton

7.0 MSR Settings

7.1 Setting Command

The setting data command is a collection of one or more function setting blocks and its format is as the following:

Command: <STX><S><FuncSETBLOCK1>…<FuncBLOCKn><ETX><LRC>
Response: <ACK> or <NAK> for wrong command (invalid funcID, length or value)

Each function-setting block <FuncSETBLOCK> has following format:

<FuncID><Len><FuncData>
The setting command will function with any one, any group or all the setting in one command.

Where:
<FuncID> is one byte identifying the setting(s) for the function.
<Len> is a one byte length count for the following function-setting block <FuncData>.
<FuncData> is the current setting for this function. It has the same format as in the sending command for this function.

7.2 Get Setting

This command will send current setting to application.
Command: <STX> <R> <ReviewID> <ETX> <LRC 1>
Response: <ACK> <STX> <FuncID> <Len> <FuncData> <ETX> <LRC 2>

<FuncID>, <Len> and <FuncData> definition are same as described above.
Note: ReviewID (value 0x1F) will return all funcID-s.

7.3 Security Management

The MSR reader is intended to be a secure reader. Security features include:

- Can include Device Serial Number
- Can encrypt track 1 and track 2 data for all bank cards (ETrk1 and ETrk2 will be empty if non bank card is swiped).
- Provides clear text confirmation data including card holder's name and a portion of the PAN as part of the Masked Track Data (for bank cards)
- Optional display expiration data (for bank cards)
- Configurable Security Level

The reader supports five Security Levels. This allows customer to select the security profile needed for the application. The Security Level can be raised by command, but can never be lowered:

- Level 0
  Security Level 0 is a special case. It signifies that all DUKPT keys have been used. In this case the unit is at the end of its useful life. This level is set automatically by the reader when it runs out of DUKPT keys. The life time of DUKPT keys is one millions. Once reach the end of keys' life time, user should inject DUKPT keys again.

- Level 1
  Reader properties are as configured from factory having the lowest level of default settings. There is no encryption process, no key serial number transmitted with decoded data. The reader has read operation and decoded track data is sent in default format.
  Encrypt type TDES and AES cannot be selected under Level 1.

- Level 2
  Key Serial Number and/or Initially Loaded Device Key have been injected. The encryption process is not activated and decoded track data is sent in default format. Key Serial Number and Initially Loaded Device Key can be set only once after manufacture.

- Level 3
  Both Key Serial Number and Initially Loaded Device Keys are injected and encryption is on. The encryption process is activated. The output of level 3 will be different from level 1 and level 2.
  Clear data output cannot be selected under Level 3. The output format in this level is more rigidly fixed so many track formatting output options are not supported, see function ID table for limitations.

- Level 4
  When the reader is at Security Level 4, a correctly executed Authentication Sequence is required before the reader sends out data for a card swipe.
  Commands that require security must be sent with a four byte Message Authentication Code (MAC) at the end. Note that data supplied to MAC algorithm should NOT be converted to ASCII-Hex; rather it should be supplied in its raw binary form. Calculating MAC requires knowledge of current DUKPT KSN, this could be retrieved using Get DUKPT KSN and Counter command. The output format in this level is more rigidly fixed so many track formatting output options are not supported, see function ID table for limitations.

7.4 Encryption Management

The Encrypted swipe read supports TDES and AES encryption standards for data encryption. Encryption can be turned on via a command. TDES is the default.

If the reader is in security level 3, for the encrypted fields, the original data is encrypted using the TDES/AES CBC mode with an Initialization Vector starting at all binary zeroes and the Encryption Key associated with the current DUKPT KSN.

7.4.1 Key Management

The encryption key is TDES with 128 bit keys (128 bit keys including parity) or AES encryption with double length keys.

Key Injection
As this device is using DUKPT as key management, it is necessary to load initially the Key Serial Number (KSN) and the Loaded Device Key before transaction.
SecureMag is designed to support multiple key injection events, which means KSN and Initially Loaded Device Key can be loaded more than one time. Key injection commands are “Get Key status”, “Load KSN” and “Load Device Key”. In order to keep the security of key transportation, “Load Device Key” command is encrypted using RSA public key. Command protocol is the same, the only difference is <Command Data> and <Respond Data> are encrypted with AES256 and then use BASE64 convert to output data. Customers who want to do their own key injection share this public key.

“Load KSN” and “Load Device Key” are initially injected by secure facility.

KSN and Initially Loaded Device Key loading commands and responses protocol:
Command:
<STX><’F’><’F’><Command Data (BASE64)><0x0D><0x0A><ETX><LRC>
Response:
<ACK/NAK><STX><’F’><’F’>< Respond Data (BASE64)><0x0D><0x0A><ETX><LRC>

STX: 0x02
ETX: 0x03
ACK: 0x06
NAK: 0x15
BASE64: Data encoded with base64 algorithm
LRC: Xor’d all the data before LRC except STX.

A successful key loading process includes the following steps:

- Enter Key loading mode (optional)
  Command: \55\01\06\08\09\01\5A
  Response: \06

- Get Key status
  Command Data: <FF><13><01><02><LRC>
  Response Data: <FF><00><01><04><LRC>

- Load KSN
  Command Data: <FF><0A><11><KSN#><KSN bytes><LRC>
  Response Data: <FF><00><06><RESPONSE CODE><LRC>
  <KSN#>: TDES: 0x32 DES: 0x0A
  <KSN bytes>: 10 bytes ASCII for KSN
  <RESPONSE CODE>: 6 bytes data in ASCII format which is converted from the first 3 cipher hex data. These cipher data are generated by encrypting KSN bytes and "00 00 00 00 00 00 00 00".

- Load Device Key
  Command Data: <FF><0A><LENGTH><KEY#><KEY bytes><LRC>
  Response Data: <FF><00><06><RESPONSE CODE><LRC>
  <LENGTH>: TDES: 0x21 DES: 0x11
  <KEY#>: TDES: 0x33 DES: 0x0B PUBLIC_N: 0x37 PUBLIC_E: 0x38
  <KEY bytes>: TDES: 0x20 DES: 0x10
  <RESPONSE CODE>: 6 bytes data in ASCII format which is converted from the first 3 cipher hex data. These cipher data are generated by encrypting KEY bytes and "00 00 00 00 00 00 00 00".

<0x02><0x46><0x46><0x04><0x52><length_L><length_H><encrypted base64 block><0x03><lrc>

<lrc> : Xored from the 1st 0x46 to 0x03
<Length_L><Length_H> is the length of <encrypted base64 block>, <length_L> is 0x00, <length_H> is 0x01 here.

<encrypted base64 block>: encrypted key block.
The 1st step is using base64 to wrap DUKPT base key, generate a base64 block:
<0xff><0x0a><0x21><0x33><32 bytes Key ascii code>

The 2nd step: adjust/pad base64 block to generate following block:
<0x00><0x00><0x00><base64block length><0xff>…<0xff><0x00><base64block>

Here is the way to generate this block: set Byte1, byte2, byte3 to 0, byte4 is the length of base64block. Other bytes are padded with 0xff. The byte before base64block is set to 0. Totally there are 256 bytes in this block.

The last step: encrypt the whole 256 bytes block with RSA public key.

- Quit Key loading mode (optional)
  Command: \55\01\06\08\01\01\5A
  Response: \06

Example commands:

1. Get Key status
   Command: \02\46\46\2F\78\4D\42\41\75\38\3D\0D\0A\03\LRC
   Response: \06\02\46\46\.....\0D\0A\03\LRC

2. Load KSN
   Command:
   \02\46\46\2F\77\6F\52\4D\6B\5A\47\52\6B\59\35\4F\44\63\32\4E\54\
   51\7A\4D\6A\45\77\52\54\43\69\0D\0A\03\5D
   Response: \06\02\46\46\.....\0D\0A\03\LRC

3. Load Encryption Key
   Command:
   \02\46\46\2F\77\6F\68\4D\7A\5A\42\51\7A\49\35\4D\6B\5A\42\51\54
   \45\7A\4D\54\56\43\4E\45\51\34\4E\54\68\42\51\6A\4E\42\4D\30\51\
   33\52\44\55\35\4D\7A\4E\42\6C\51\3D\3D\0D\0A\03\2D
   Response: \06\02\46\46\.....\0D\0A\03\LRC

7.5 Check Card Format

- ISO/ABA (American Banking Association) Card
  Encoding method
  Track1 is 7 bits encoding.
  Track1 is 7 bits encoding. Track2 is 5 bits encoding. Track3 is 5 bits encoding.
  Track1 is 7 bits encoding. Track2 is 5 bits encoding.
  Track2 is 5 bits encoding.
  Additional checks
  Track1 2nd byte is 'B'.
  There is only one '=' in track 2 and the position of '=' is between 12th ~ 20th character.
  Total length of track 2 is above 19 characters.
  Card number range in PAN will be used to identify bank card.

- AAMVA (American Association of Motor Vehicle Administration) Card
  Encoding method
    Track1 is 7 bits encoding. Track2 is 5 bits encoding. Track3 is 7 bits encoding.
- Others (Customer card)

7.6 MSR Data Masking

For ABA Card Data (Card type 0)
For cards that need to be encrypted, both encrypted data and clear text data are sent.
Masked Area
The data format of each masked track is ASCII.
The clear data include start and end sentinels, separators, first N, last M digits of the PAN, card holder name (for Track1). Optional expiration date may be revealed.
The rest of the characters should be masked using mask character.

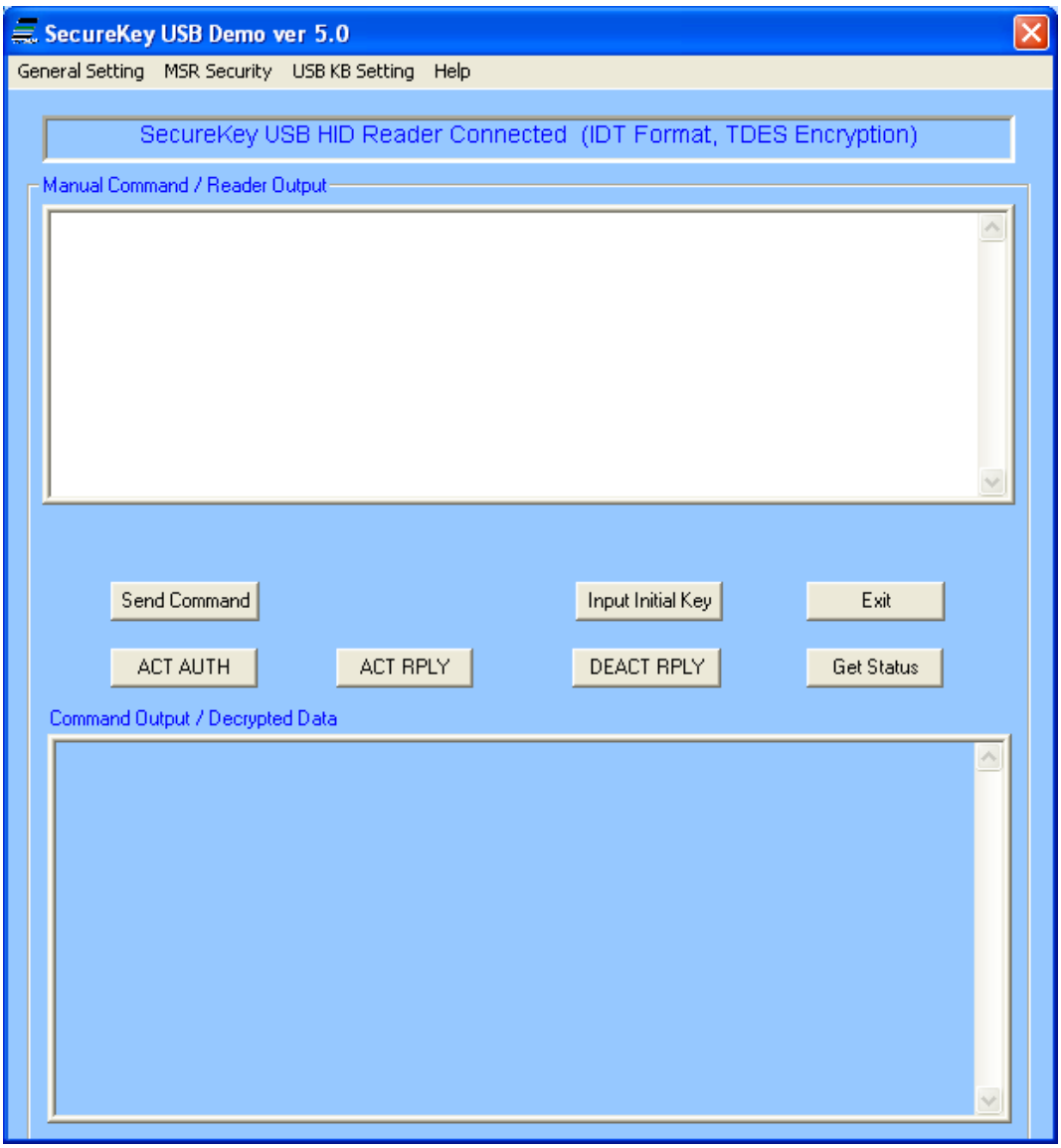
Mask character default value is '*'.

8.0 MSR Decryption Demo Software

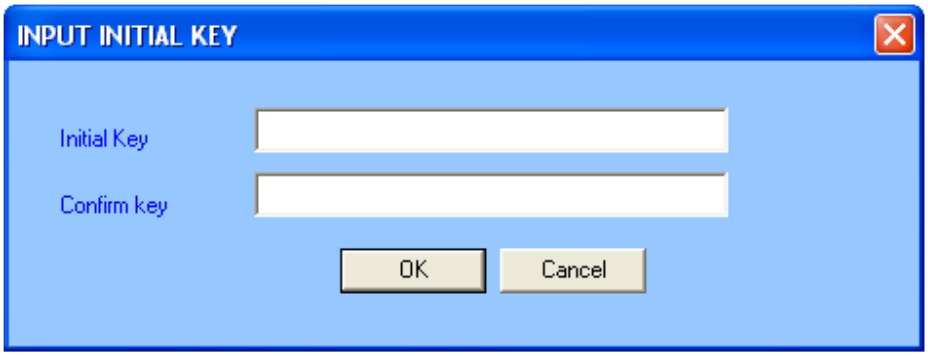
A SecureKey demo software is available to demonstrate the MSR data decryption. Please see the below screenshots:

This demo software can be used for USB-HID or USB KB interface. For USB KB interface, please make sure the cursor is placed in the “manual command” window before swiping a card.

The following demo software screenshots are shown for reference and might not reflect the latest demo software version.

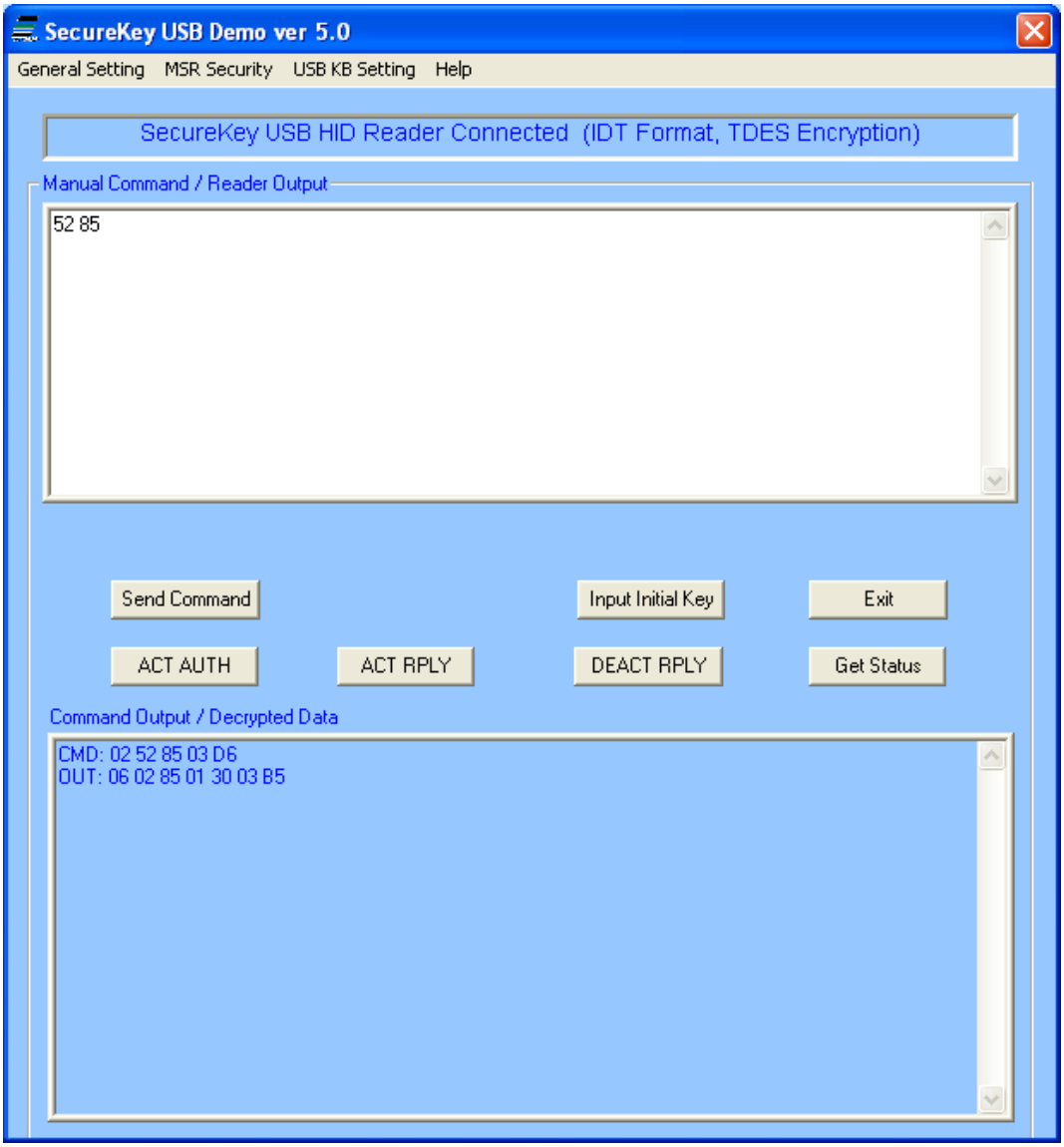


The demo software uses the IDTECH demo key
0123456789ABCDEFFEDCBA9876543210
to decrypt the swiped or entered data by default. To change the decryption key, click on "input initial key".



8.1 Card Swipe Data, IDTECH Original Encryption Format

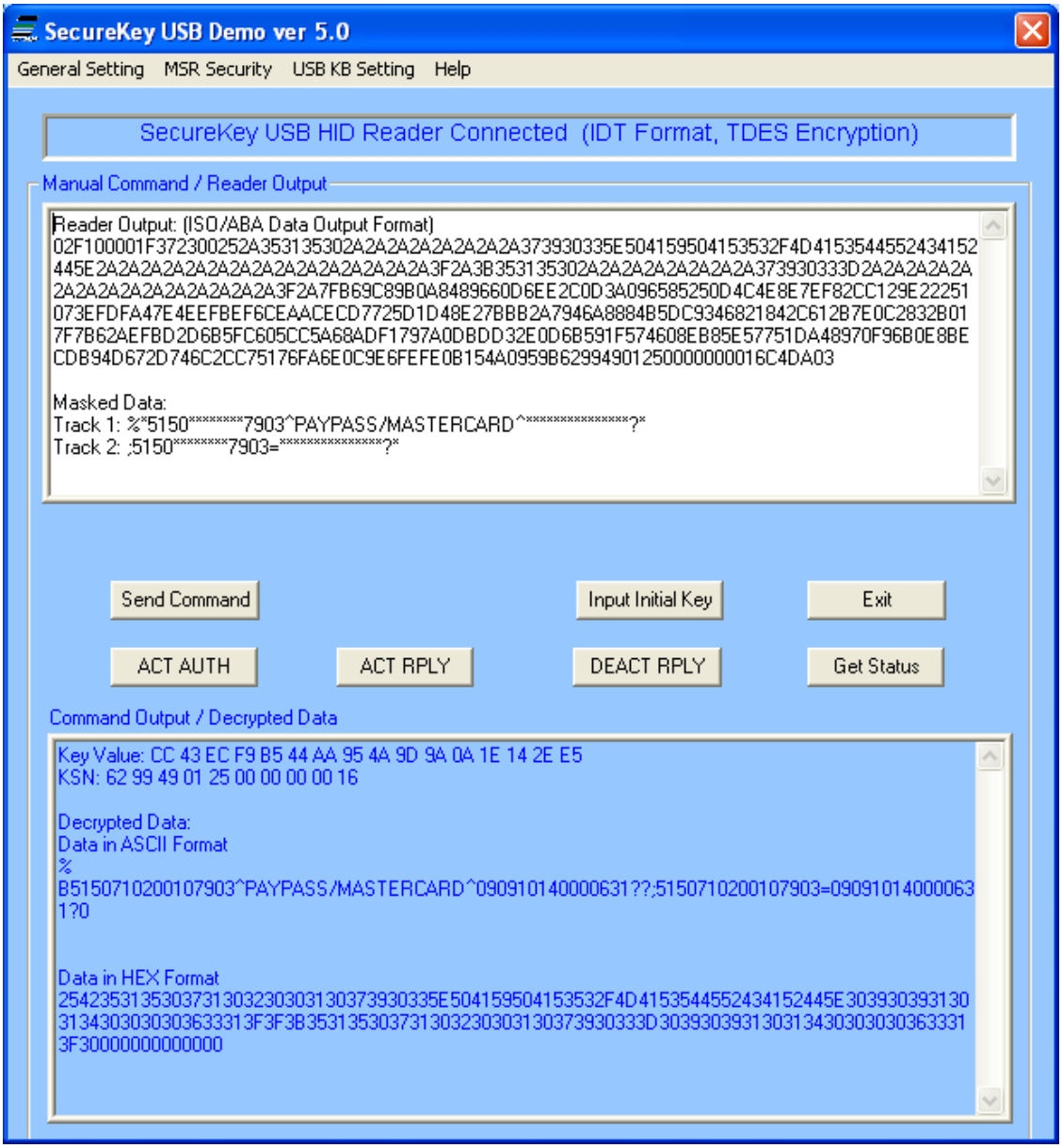
Type 52 85 on the manual command screen to see the current SecureKey setting and press "Send Command"



Check the 5th byte of the response, if it's "30", the SecureKey is in IDTECH original encryption format, for example 06 02 85 01 30 03 85
If the 5th byte is "31", the SecureKey is in IDTECH enhanced encryption format.

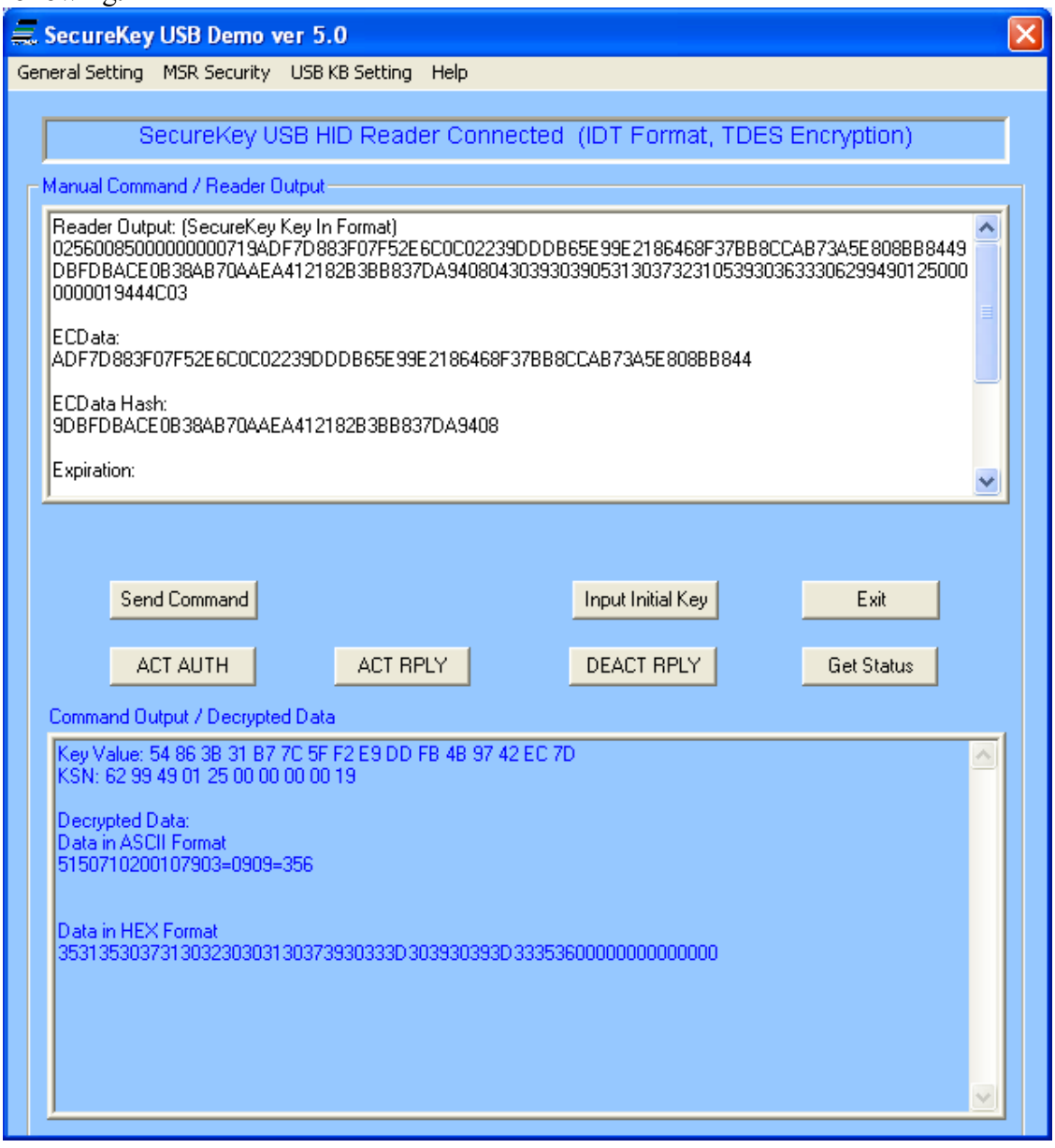
To change the encryption format, go to "MSR Security" and select the original or enhanced encryption format

Swipe a card, the output and decrypted data will be shown on screen.


SecureKey USB Demo ver 5.0
General Setting
MSR Security
USB KB Setting
Help
SecureKey USB HID Reader Connected (IDT Format, TDES Encryption)
Manual Command / Reader Output
Reader Output: (ISO/ABA Data Output Format)
02F100001F372300252A3531353002A2A2A2A2A2A2A373930335E5041595041535 32F4D4153544552434152
445E2A2A2A2A2A2A2A2A2A2A2A2A2A2A2A2A2A3F2A3B353135302A2A2A2A2A2A2A373930333D2A2A2A2A2A
2A2A2A2A2A2A2A2A2A2A2A3F2A7FB69C89B0A8489660D6EE2C0D3A096585250D4C4E8E7EF82CC129E22251
073EFDFA47E4EEFBEF6CEAACECD7725D1D48E27BBB2A7946A8884B5DC9346821842C612B7E0C2832B01
7F7B62AEFBD2D6B5FC605CC5A68ADF1797A0DBDD32E0D6B591F574608EB85E57751DA48970F96B0E8BE
CDB94D672D746C2CC75176FA6E0C9E6FEFE0B154A0959B629949012500000000016C4DA03
Masked Data:
Track 1: %*5150********7903^PAYPASS/MASTERCARD^***************?*
Track 2: ;5150********7903=***************?*
Send Command
Input Initial Key
Exit
ACT AUTH
ACT RPLY
DEACT RPLY
Get Status
Command Output / Decrypted Data
Key Value: CC 43 EC F9 B5 44 AA 95 4A 9D 9A 0A 1E 14 2E E5
KSN: 62 99 49 01 25 00 00 00 00 16
Decrypted Data:
Data in ASCII Format
%
B5150710200107903^PAYPASS/MASTERCARD^0909101400006311?;5150710200107903=090910140000631?0
Data in HEX Format
2542353135303731303230303130373930335E5041595041535 32F4D4153544552434152445E303930393130
313430303030363331 3F3F3B3531353037313032303031303739303 33D303930393130313430303030363331
3F30000000000000

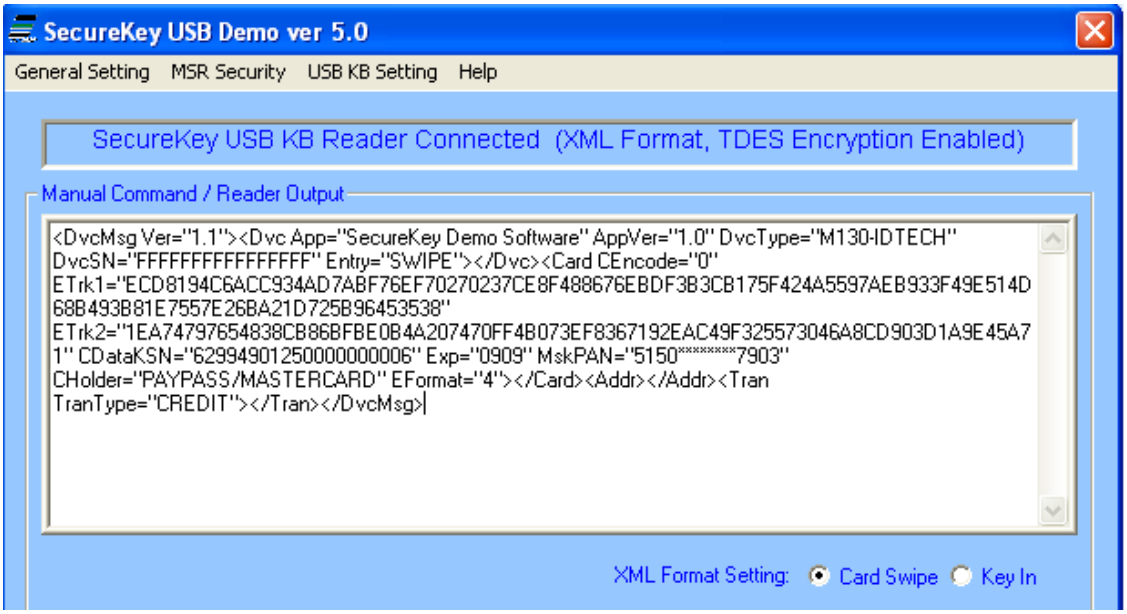
8.2 Key in data, IDTECH Format

Manually key in the card data on the device, the data will show on the demo as the following:

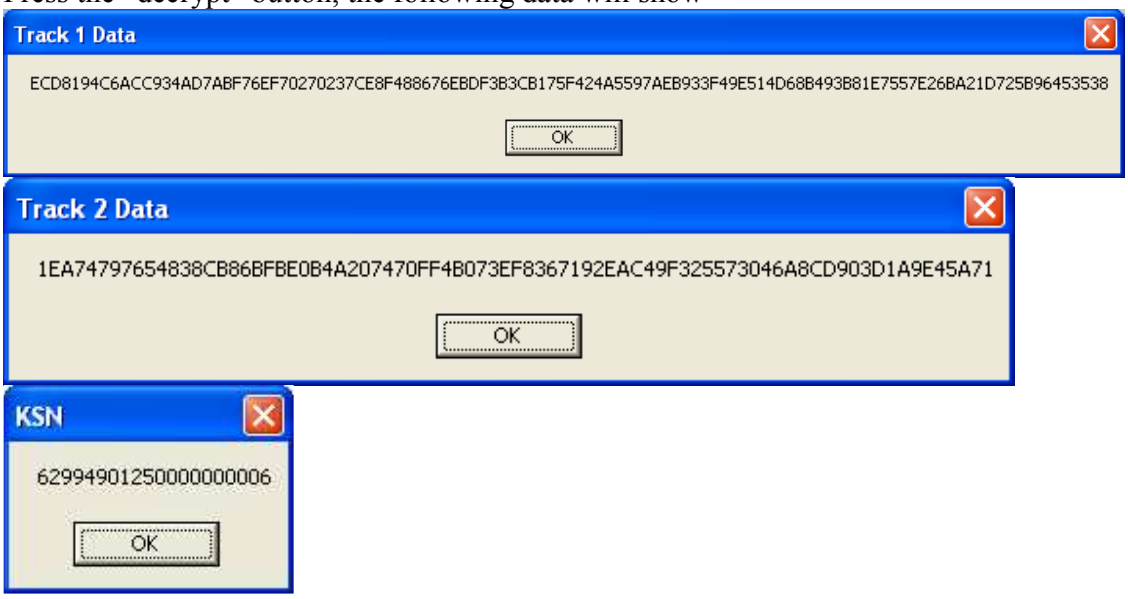


8.3 Card Swipe Data, XML Format

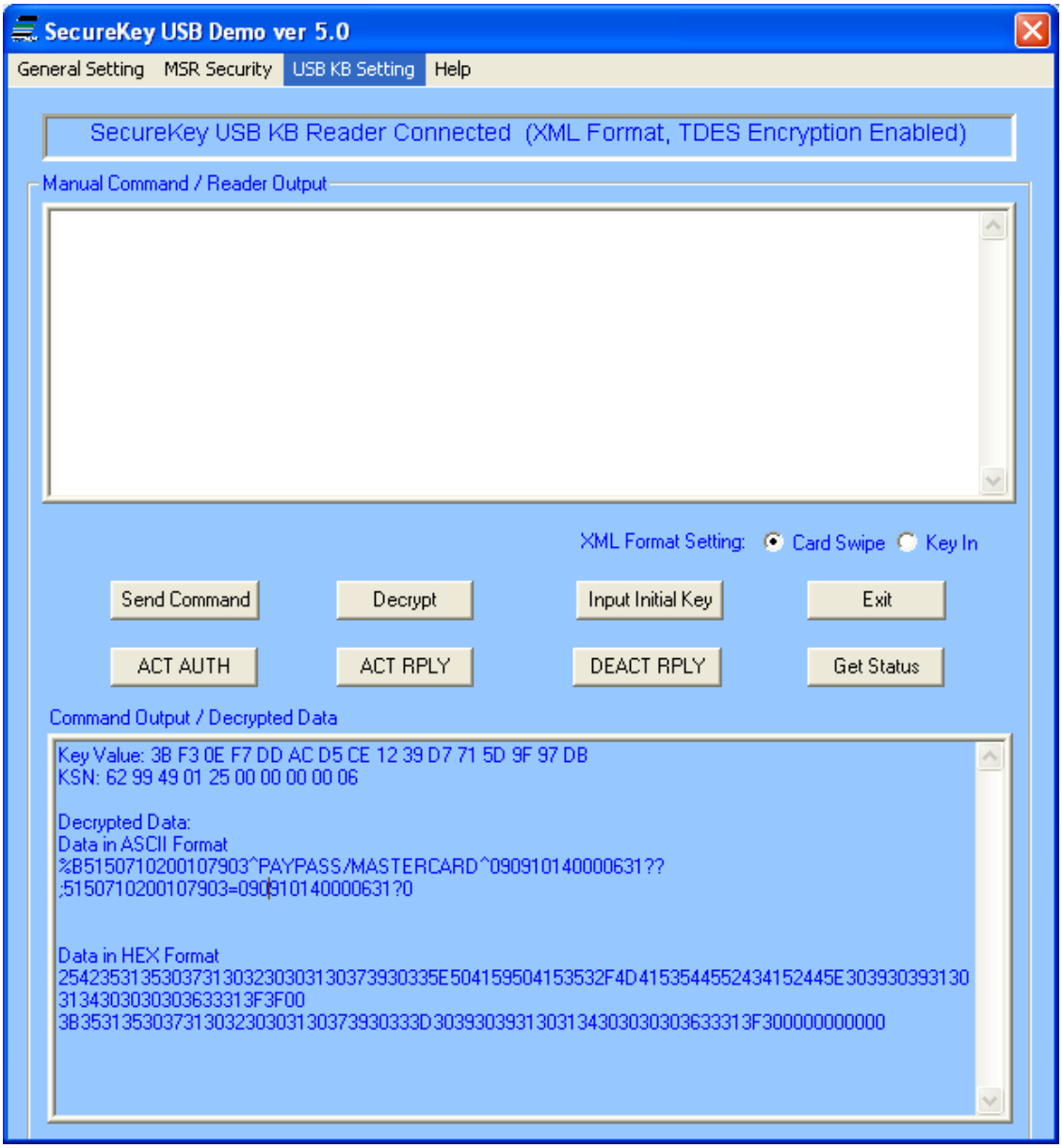
Make sure the “Card Swipe” button is checked and then swipe a card.



Press the “decrypt” button, the following data will show

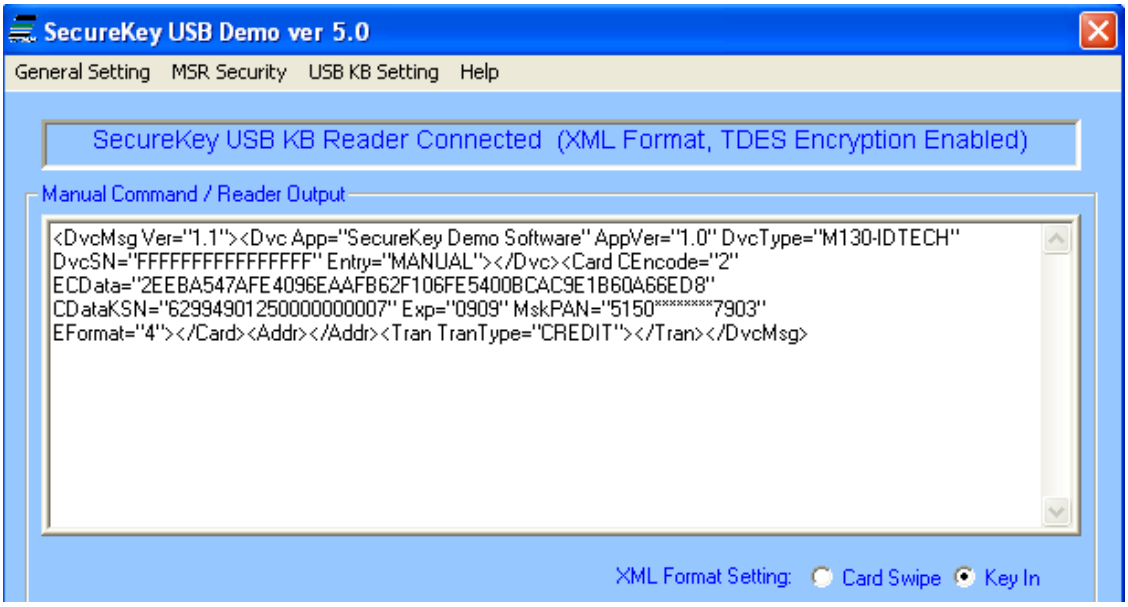


The decrypted data is as shown below:

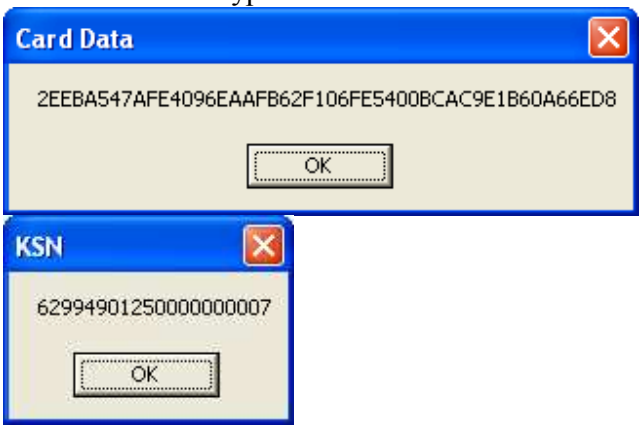


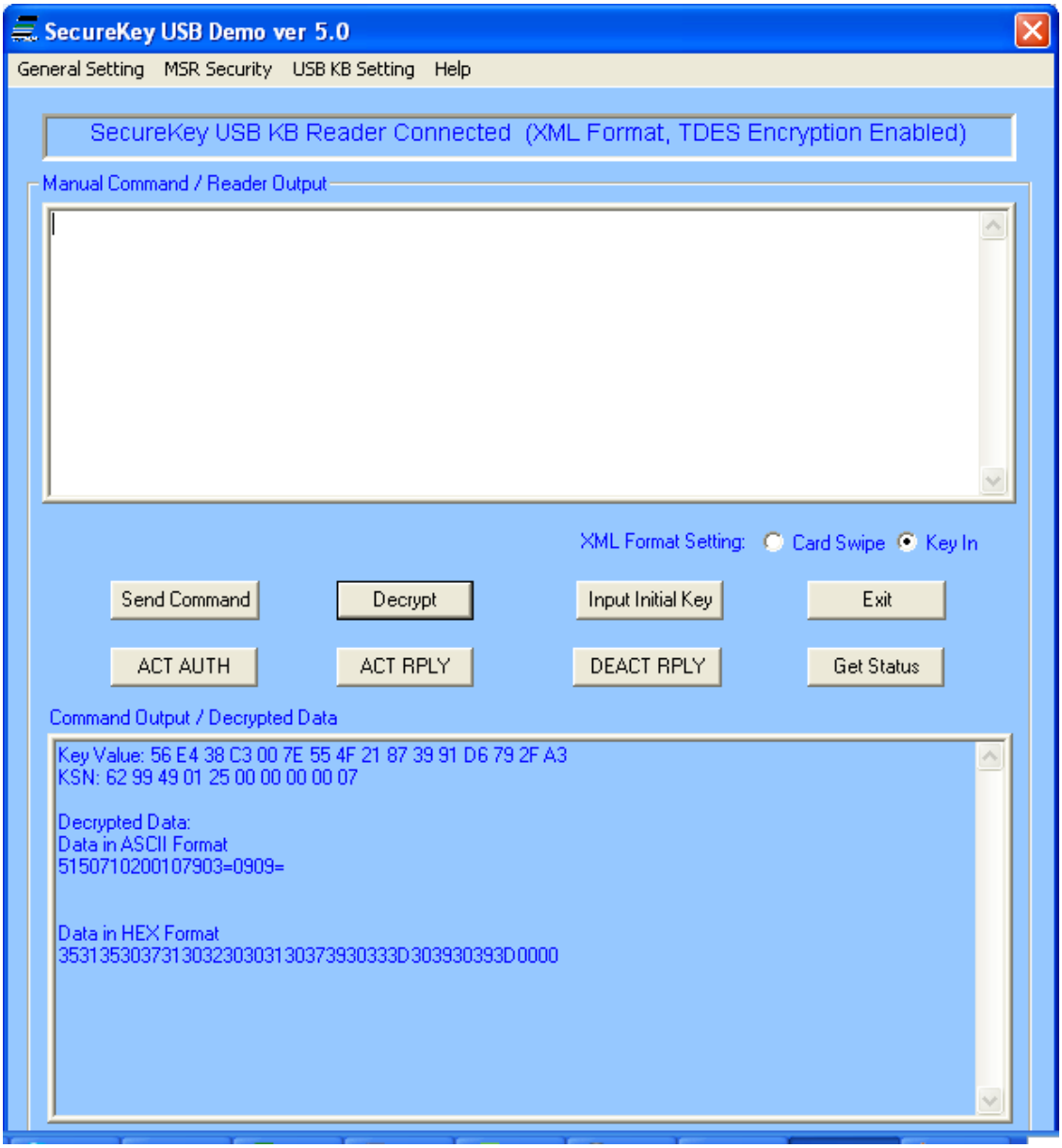
8.4 Key in Data, XML Format

Make sure the “Key In” button is checked and then enter the card data.



Click on the “decrypt” button




SecureKey USB Demo ver 5.0
General Setting
MSR Security
USB KB Setting
Help
SecureKey USB KB Reader Connected (XML Format, TDES Encryption Enabled)
Manual Command / Reader Output
XML Format Setting:
Card Swipe
Key In
Send Command
Decrypt
Input Initial Key
Exit
ACT AUTH
ACT RPLY
DEACT RPLY
Get Status
Command Output / Decrypted Data
Key Value: 56 E4 38 C3 00 7E 55 4F 21 87 39 91 D6 79 2F A3
KSN: 62 99 49 01 25 00 00 00 00 07
Decrypted Data:
Data in ASCII Format
5150710200107903=0909=
Data in HEX Format
353135303731303230303130373930333D303930393D0000

9.0 Specifications

Mechanical

ITEM	SPECIFICATION
Keyswitch Information	
Total/ Pre-Travel	2.5 + 0.5 mm/ 1.5 + 0.4 mm
Operating Type	Tactile Type
Operating Force	55 + 7g
Tactile Feel Force	30 + 14g
Letter of Keycap	Traditional North American
Material of Key switch	Silicone Rubber (Rubber Key Pad)
Keyboard Information	
Enclosure	Top & Bottom Case
Material	High Impact ABS
Color	Black
Cable Information	
Jacket Material	Polyester 0.075 mm
Conductors	Polyester 0.10 mm
Color	Upper circuit: 3M467+PET125S
Length	Lower circuit: 3M467+PET 100S
PC Connector	Acheson ED-725A 5~10 um
Keyboard Membrane Material	The auxiliary ports are only on the USB keyboard &
Spacer	located horizontal to each other on the rear. USB port
Back-up Plate	plastic color is white.
Upper Circuit	
Lower Circuit	
Silver	
Interface	USB-KB and USB-HID

Electrical

ITEM	SPECIFICATION
Max Rating	+5.0 VDC ±10%, 60ma Max (excludes ICC)
Type of Circuit	1 Circuit 1 Contact
Insulation Resistance	DC 100V 50 M Ω Min
Bounce	10 ms Max
Operating Life	20,000,000 keystrokes
Industry Requirements	FCC class B and CE

Quality & Reliability

ITEM	SPECIFICATION
MI Requirement	The keyboard meets the FCC class B limits
ESD Immunity	The keyboard passes 0KV to 8 kV minimum without any data loss; passes 8KV to 15 kV minimum that may cause malfunctions. No internal components are destroyed and after reset, the keyboard functions normally.
MTBF	The main operating time between failures will be more than 60,000 hours
	610 mm (24”) height
Drop	Drop: 4 corner, 4-sidelines, 2-sides front/back
Vibration	Vibration frequency 60 Hz/sec. 3 mm amplitude of an oscillation. X,Y,Z each axis at 2 hours
Operating Temperature	0°C ~ 40°C
Storage Temperature	-20°C ~ + 40°C

MagStripe Reader

Number of tracks	Tracks 1 & 2 or Tracks 2 & 3 or Tracks 1, 2 & 3
Encryption	TDES or AES with DUKPT key management
Compatibility	ISO 7810 and 7811-1 through -6
Output data formatting	Standard or XML output format
Operating Life	1,000,000 card swipes
Card speed range	3 to 60 IPS (Inches Per Second)